

WHAT IS CLAIMED IS:

1. A group-III nitride semiconductor light-emitting diode comprising at least a first conduction-type single crystal substrate provided with a first conduction-type back-surface ohmic electrode on a back surface thereof, a buffer layer comprising a boron phosphide (BP)-based material on a front surface of said
5 single crystal substrate, a gallium nitride (GaN)-based group-III nitride crystal layer having a light-emitting part of hetero-junction structure on said buffer layer, and a window layer comprising an electrically conducting transparent oxide crystal layer on said group-III nitride crystal layer, wherein at least a second conduction-type surface ohmic electrode conductive with said window layer is
10 between the surface of said group-III nitride crystal layer and said window layer and comes into contact with the surface of said group-III nitride crystal layer and a pad electrode for wire bonding is on the center of the upper surface of said window layer.

2. The group-III nitride semiconductor light-emitting diode as claimed in claim 1, wherein said second conduction-type surface ohmic electrode is disposed in a periphery of said pad electrode.

3. The group-III nitride semiconductor light-emitting diode as claimed in claim 1 or 2, wherein said second conduction-type surface ohmic electrode is disposed at a bilaterally symmetric position with respect to the center of said pad electrode.

4. The group-III nitride semiconductor light-emitting diode as claimed in claim 1 or 2, wherein second conduction-type surface ohmic electrodes are disposed at isometric positions from the center of said pad electrode.

5. The group-III nitride semiconductor light-emitting diode as claimed in claim 1 or 2, wherein said second conduction-type surface ohmic electrode is composed of a plurality of electrodes disposed at equal intervals.

6. The group-III nitride semiconductor light-emitting diode as claimed

in claim 1 or 2, wherein said second conduction-type surface ohmic electrode is disposed in an open light-emitting region other than a projective region of the pad electrode on the surface of said group-III nitride crystal layer.

7. The group-III nitride semiconductor light-emitting diode as claimed in claim 6, wherein a sum of areas of second conduction-type surface ohmic electrodes is from 5 to 30% of a total area of the open light-emitting region.

8. The group-III nitride semiconductor light-emitting diode as claimed in claim 1 or 2, wherein the group-III nitride crystal layer in contact with said second conduction-type surface ohmic electrode comprises gallium phosphide nitride represented by $\text{GaN}_{1-x}\text{P}_x$ wherein $0 < x < 1$.

9. A light-emitting diode lamp comprising the group-III nitride semiconductor light-emitting diode claimed in claim 1 or 2, a mount lead and an inner lead.

10. A light source comprising the light-emitting diode lamp claimed in claim 9.

11. An electrode for group-III nitride semiconductor light-emitting diodes for a group-III nitride semiconductor light-emitting diode comprising at least a gallium nitride (GaN)-based group-III nitride crystal layer having a light-emitting part of a hetero-junction structure, and a window layer comprising an electrically conducting transparent oxide crystal layer provided on said group-III nitride crystal layer, wherein at least a surface ohmic electrode conductive with said window layer is between the surface of said group-III nitride crystal layer and said window layer and comes into contact with the surface of said group-III nitride crystal layer and a pad electrode for wire bonding is on the center of the upper surface of said window layer.

12. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 11, wherein said surface ohmic electrode is disposed at a position in a periphery of said pad electrode.

13. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 11 or 12, wherein said surface ohmic electrode is disposed at a bilaterally symmetric position with respect to the center of said pad electrode.

14. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 11 or 12, wherein surface ohmic electrodes are disposed at isometric positions from the center of said pad electrode.

15. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 11 or 12, wherein said surface ohmic electrode is composed of a plurality of electrodes disposed at equal intervals.

16. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 11 or 12, wherein said surface ohmic electrode is disposed in an open light-emitting region other than a projective region of the pad electrode on the surface of said group-III nitride crystal layer.

17. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 16, wherein a sum of areas of said surface ohmic electrodes is from 5 to 30% of a total area of the open light-emitting region.

18. The electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 11 or 12, wherein the group-III nitride crystal layer in contact with said surface ohmic electrode comprises gallium phosphide nitride represented by $\text{GaN}_{1-x}\text{P}_x$ wherein $0 < x < 1$.

19. A method for producing an electrode for group-III nitride semiconductor light-emitting diodes, comprising

forming a surface ohmic electrode in contact with a surface of a gallium nitride (GaN)-based group-III nitride crystal layer having a light-emitting part of hetero-junction structure,

then covering the surface of said group-III nitride crystal layer and said surface ohmic electrode to form a window layer comprising an electrically

conducting transparent oxide crystal layer conductive with said surface ohmic electrode, and

10 then forming a pad electrode for wire bonding on a center of the upper surface of said window layer conductive with said window layer.

20. The method for producing an electrode for group-III nitride semiconductor light-emitting diodes as claimed in claim 19, wherein the pad electrode is formed on the group-III nitride crystal layer through a window layer comprising an electrically conducting transparent oxide crystal layer so that the
5 electrically conducting transparent oxide crystal layer is not present on the surface of the pad electrode used for wire bonding.

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